# LOUIS J. GHOSN, PH.D.

# Journal

# 2004

- 1. "A Combined NDT/Fatigue Test and three Dimensional Image Processing Study of a SiC/SiC Composite System," Ali Abdul-Aziz, Louis J. Ghosn, George Y. Baaklini, Richard W. Rauser and Jon D. Zima, Materials Evaluation, Journal of the American Society for Nondestructive Testing, Vol. 62, No. 12, December 2004, pp. 1222-1226.
- 2. "A Computer Code for Gas Turbine Engine Weight and Disk Life Estimation," Michael T. Tong, Ian Halliwell and Louis J. Ghosn, ASME Journal of Engineering for Gas Turbines and Power, Vol. 126, No. 2, April 2004, pp. 265-270.
- 3. "Effect of Surface Impulsive Thermal Loads on Fatigue Behavior of Constant Volume Propulsion Engine Combustor Materials," Dongming Zhu, Dennis S. Fox, Robert A. Miller, Louis J. Ghosn, Sreeramesh Kalluri, Submitted to the Journal of Surface and Coatings Technology.

#### 2003

4. "A Combined NDT/Finite Element Technique to Study the Effects of Matrix Porosity on the Behavior of Ceramic Matrix Composites", Ali Abdul-Aziz, Louis J. Ghosn, George Y. Baaklini and Ramakrishna Bhatt, Materials Evaluation, Journal of the American Society for Nondestructive Testing, Vol. 61, No. 11, November 2003, pp. 1217-1221.

#### 2000

- 5. "Assessments of Low Cycle Fatigue Behavior of Powder Metallurgy Alloy U720", T.P. Gabb, P.J. Banacuse, L.J. Ghosn, J.W. Sweeney, A. Chatterjee, and K.A. Green, Fatigue and Fracture Mechanics: 31st Volume, ASTM STP 1389, G.R. Halford and J.P. Gallagher, Eds., American Society for Testing and Materials, Philadelphia, 2000, pp. 110-127.
- 6. "Effect of Fiber Volume Fraction on the Fracture Behavior of Nb-1 Wt Pct Zr/218W Composites at Elevated Temperatures", S.V. Raj and L.J. Ghosn, Metallurgical and Materials Transactions A, Vol. 31A, March 2000, pp. 873-877.

# 1996

7. "Fatigue Crack Growth Behavior of PWA 1484 Single Crystal Superalloy at Elevated temperatures", J. Telesman and L.J. Ghosn, J. of Eng. for Gas Turbines and Power, Transaction of ASME, vol. 118, April, 1996, pp. 399-405.

# 1995

8. "Optimum Notch Configurations for the Chevron-Notched Four-Point Bend Specimens", A. M. Calomino and L.J. Ghosn, Int. J. of Fracture, vol. 72, 1995, pp. 311-326.

#### 1994

- 9. "Analytical Modelling of the Interfacial Stress State During Pushout Testing of SCS-6/Ti-Based Composites", L.J. Ghosn, J.I. Eldridge, and P. Kantzos, ACTA Metallurgica et Materialia, vol. 42, no. 11, 1994, pp. 3895-3908.
- 10. "Fatigue Crack Growth and Crack Bridging in SCS-6/Ti-24-11", L.J. Ghosn, P. Kantzos, and J. Telesman, Cyclic Deformation, Fracture, and Nondestructive Evaluation of Advanced Materials: Second Volume, ASTM STP 1184, M.R. Mitchell and O. Buck, Eds., American Society for Testing and Materials, Philadelphia, 1994, pp. 64-86.

#### 1993

11. "Methodology for Prediction of Fiber Bridging Effects in Composites", J. Telesman, L.J. Ghosn, and P.T. Kantzos, ASTM Journal of Composites Technology & Research, vol. 15, no. 3, Fall 1993, pp. 234-241.

12. "Analytical Stress Intensity Solution for the Stable Poisson Loaded Specimen", L.G. Ghosn, A.M. Calomino, and D.N. Brewer, International Journal of Fracture, vol. 60, 1993, pp. 209-220.

#### 1992

- 13. "Stochastic modeling of crack initiation and short-crack growth under creep and creep-fatigue conditions", T. Kitamura, L.J. Ghosn, and R. Ohtani, ASME Journal of Applied Mechanics, vol. 59, June 1992, Part 2, pp. S35-S42, (also NASA TM101358).
- 14. "Modeling of Crack Bridging in A Unidirectional Metal Matrix Composite", L.J. Ghosn, J. Telesman and P. Kantzos, International Journal of Fracture, vol. 54, 1992, pp.345-357.

#### 1991

15. "Fatigue Crack Growth in a Unidirectional SCS-6/Ti-15-3 Composite", P. Kantzos, J. Telesman, and L. Ghosn, Composite Materials: Fatigue and Fracture (Third Volume), ASTM STP 1110, T.K. O'Brien, ed., 1991, pp. 711-731.

#### 1989

16. "The Unusual Near-Threshold FCG Behavior of A Single Crystal Superalloy and the Resolved Shear Stress as The Crack Driving Force", J. Telesman and L. Ghosn, Engineering Fracture Mechanics, vol. 34, no. 5/6, 1989, pp.1183-1196.

# 1988

17. "Analysis of crack propagation in roller bearings using the boundary integral equation method -A mixed-mode loading problem", L.J. Ghosn, ASME Journal of Tribology, vol. 110, no. 3, July 1988, pp. 408-413.

# 1984

18. "Three-dimensional analysis of short-bar chevron-notched specimens by the boundary integral method", A. Mendelson and L.J. Ghosn, in Chevron-Notched specimens: testing and stress analysis, ASTM STP 855, J.H. Underwood, S.W. Freimen, and F.I. Baratta eds, 1984, pp.69-80.

# **NASA Technical Reports**

# 2004

1. "A CAD Approach to Integrating NDE with Finite Element", Ali Abdul-Aziz, James Downey, Louis J. Ghosn and George Y. Baaklini, NASA TM -2004-212904, April 2004.

# 2002

2. "Residual Stresses in Thermal Barrier Coatings for a Cu-8Cr-4Nb Substrate System", Louis J. Ghosn, and Sai V. Raj, NASA TM-2002-211561, July 2002.

#### 1998

- 3. "Effect of Layer-Graded Bond Coats on Edge Stress Concentration and Oxidation Behavior of Thermal Barrier Coatings", D-M. Zhu, L.J. Ghosn, and R.A. Miller, NASA TM-1998-208505, November 1998.
- 4. "An Assessment of the Axial and Radial Dilation of a DPIMS Tantalum Cartridge During a Simulated Space Shuttle Flight Test", S.V. Raj, and L.J. Ghosn, NASA TM-1998-20744, July 1998.

#### 1997

5. "Report on the CT7 disk failure" A. Calomino, P. Kantzos, and L. Ghosn, Appendix F,NTSB File Number FTW96FA282 Accident Report, National Transportation Safety Board Supporting Documentation File, March, 11, 1997.

- 6. "Toughened Ceramics Life Prediction", J.A. Salem, S.R. Choi, and L.J. Ghosn, DOE report, W.B.S. Element 3.2.1.7, July 1996.
- 7. "Crack Growth and Life Prediction in Single-Crystal Nickel Superalloys, vol. 3", J. Telesman and L.J. Ghosn, Air Force Material Command report, WL-TR-94-4090, Feb. 1996.

# 1994

- 8. "The Role of Crack Formation in Chevron-Notched Four-Point Bend Specimens", A.M. Calomino, and L.J. Ghosn, NASA TM 106631, August 1994.
- 9. "Fracture Behavior of Ceramics under Displacement Controlled Loading", A.M. Calomino, D.N. Brewer, and L.J. Ghosn, NASA TM 105565, July 1994.
- 10. "Compliance Measurements of Chevron Notched Four Point Bend Specimens", A.M. Calomino, R. Bubsey, and L.J. Ghosn, NASA TM 106538, April 1994.

#### 1992

11. "Numerical Calibration of the Stable Poisson Loading Specimen", L.J. Ghosn, A.M. Calomino, and D.N. Brewer, NASA TM 105609, October 1992.

# 1989

- 12. "Optimum interface properties for metal matrix composites", L.J. Ghosn and B.A. Lerch, NASA TM 102295, August 1989.
- 13. "Reliability-based failure analysis of brittle materials", L.M. Powers, and L.J. Ghosn, NASA CR 184799, February 1989.

#### 1988

14. "Accelerated Crack Growth Rate At Low K in A Single Crystal Superalloy", J. Telesman and L.J. Ghosn, Int. Jour of Fracture, vol. 37, pp. Rl9-R22, 1988.

#### 1986

15. "Analysis of mixed-mode crack propagation using the boundary integral method", A. Mendelson and L.J. Ghosn, NASA CR 179518, September, 1986.

#### 1983

16. "Three-dimensional analysis of bar and rod chevron-notched specimens by boundary integral methods," A. Mendelson and L.J. Ghosn, NASA CR 172225, 1983.

# **Conference Proceedings and Presentations**

#### 2004

- 1. "Fatigue Crack Driving Forces in Nickel Base Single Crystals," Invited speaker at the Department of Engineering Physics & Mechanics Graduate Student Seminar, Kyoto University, November 22, 2004, Kyoto, Japan.
- "Analysis of Stainless Steel Sandwich Panels with a Metal Foam Core for Lightweight Fan Blade Design", James B. Min, Louis J. Ghosn, Bradley A. Lerch, Sai V. Raj, Frederic A. Holland, Jr., Mohan G. Hebsur, 45th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics & Materials Conference, Palm Springs, California, 19 - 22 Apr., 2004. (AIAA-2004-1836)
- 3. "A Combined NDE-Fatigue Testing and Three-Dimensional Image Processing Study of a SiC/SiC Composite System", Ali Abdul-Aziz , Louis J. Ghosn , George Y. Baaklini , Richard W. Rauser and John D. Zima, SPIE 9th Annual International Symposium on NDE for Health Monitoring and Diagnostics, 14-18 March, 2004, Town and Country Resort & Convention Center, San Diego, California USA.

# 2003

4. "An Assessment of the Residual Stresses in Low Pressure Plasma Sprayed Coatings on an Advanced Copper Alloy", S.V. Raj, L.J. Ghosn, A. Agrawal, and T.P. Lachtrupp, Surface Engineering: In Materials

Science II, S. Seal, J. Moore, S. Suryanarayana and A. Agarwal, eds., 2003 TMS Annual Meeting, San Diego, California, pp. 49-56.

#### 2002

- 5. "Residual Stresses in Thermal Barrier Coatings for a Cu-8Cr-4Nb Substrate System," Presented at the 26th Annual International Conference on Advanced Ceramics and Composites sponsored by the American Ceramic Society, 14 January, 2002, Cocoa Beach, Florida.
- 6. "Residual Stresses in Thermal Barrier Coatings for a Cu-8Cr-4Nb Substrate System", Louis J. Ghosn and Sai V. Raj, 26th Annual Conference on Advanced Ceramics and Materials, and Structures: B, H.T. Lin and M. Singh, eds., Ceramic Engineering and Science Proceedings, Vol. 23, Issue 4, 2002, the American Ceramic Society, pp. 409-416.

#### 2001

- "Fatigue Crack Driving Forces in PWA-1422 Single Crystals Subjected to Mixed-Mode Loading," Presented at the ASIP 2001, USAF Aircraft Structural Integrity Program Conference, Colonial Williamsburg Lodge, December 13, 2001, Williamsburg, Virginia.
- 8. "Fatigue Crack Driving Forces in PWA-1422 Single Crystals Subjected to Mixed-Mode Loading", Louis J. Ghosn, Jack Telesman, and Reji John, Proceedings of 2001 USAF Aircraft Structural Integrity Program Conference, Session X: Engines, December 11-13, 2001, Colonial Williamsburg Lodge, Williamsburg, Virginia, pp. 1-25

### 1998

- 9. "Modeling the Mechanical Response of an W/Nb-1Zr Composite System," Presented at 1998 TMS Annual Meeting, Feb. 16, 1998, San Antonio, Texas.
- 10. "Simulation of Crack Propagation in Engine Rotating Components Under Variable Amplitude Loading", P.J. Bonacuse, L.J. Ghosn, J.Telesman, A.M. Calomino, and P. Kantzos, Proceeding of Design Principles and Methods for Aircraft Gas Turbine Engine, Symposium of the Applied Vehicle Technology Panel, Agarda Meeting, May 11-15, 1998, Toulouse, France.
- 11. "Effect of Layer-Graded Bond Coats on Edge Stress Concentration and Oxidation Behavior of Thermal Barrier Coatings", D-M. Zhu, L.J. Ghosn, and R.A. Miller, Meeting Abstracts, The 193rd Meeting of the Electrochemical Society, Inc., May 3-8,1998, San Diego, vol. 98-1, Abstract no. 792.
- 12. "Modeling the Mechanical Response of an W/Nb-1Zr Composite System", L.J. Ghosn, and S.V. Raj, in Modeling the Mechanical Response of Structural Materials: Numerical Simulations, Taleff, E.M., and Mahidhara, R., eds., 1998 TMS Annual Meeting, San Antonio, Texas, Feb. 15-19, 1998, pp. 45-52.
- 13. "Response of Woven Ceramic Matrix Composite Plates Under Bending", A. Abdul-Aziz, L. Ghosn, and D. Brewer, submitted to the 10th Technical Conference of the American Society for Composites, Dearborn, MI.

- 14. "Transverse-Flexure-Induced Fiber Debonding in SCS-6/Ti-24-11," Presented at the Annual HITEMP Review 1997, April 30, 1997, Westlake, Ohio.
- 15. "A Strain Gage Technique to Measure Stable Extension in Ceramics," J.A. Salem, L.J. Ghosn, S.R. Choi, and M.G. Jenkins, in Proceeding of the Society for Experimental Mechanics, Spring Conference, June 2-4, 1997, Bellevue, WA.
- 16. "Characterization of Damage Accumulation in a C/SiC Composite at Elevated Temperatures," J. Telesman, M. Verrilli, L. Ghosn, and P. Kantzos, Physics & Process Modeling (PPM) and Other Propulsion R&T, vol. I: Materials Processing, Characterization, and Modeling; Lifing Models, NASA CP 10193, May 1, 1997, pp. 11-1, 11-12.
- 17. "Transverse-Flexure-Induced Fiber Debonding in SCS-6/Ti-24-11," L. J. Ghosn, D.L. Boyd, and J. I. Eldridge, HITEMP Review 1997, vol. II: Advanced Alloys and MMC's, NASA CP 10192, April 29-30, 1997, pp. 35-1, 35-12.

- 18. "Damage Tolerance Based Life Prediction Methodology in Ceramic Matrix Composites," Presented at the Annual HITEMP Review, October 24, 1995, Westlake, Ohio.
- 19. "Fatigue Crack Growth Behavior of PWA 1484 Single Crystal Superalloy at Elevated Temperatures," Presented at the International Gas Turbine and Aeroengine Congress & Exposition, June 5-8, 1995, Houston, Texas.
- 20. "Damage Tolerance Based Life Prediction Methodology in Ceramic Matrix Composites", L.J. Ghosn and D.W. Worthem, HITEMP Review 1995, vol. III: Turbine Materials-CMC's, Fiber and Interface Issues, NASA CP10178, Oct. 23-25 1995, pp. 49-1, 49-12.

# 1994

- 21. "Damage Tolerance Based Life Prediction Methodology in Titanium Matrix Composites," Presented at the 7th Annual HITEMP Review, October 25, 1994, Westlake, Ohio.
- 22. "Damage Tolerance Based Life Prediction Methodology in Titanium Matrix Composites," Presented at the Symposium on Life Prediction Methodology for Titanium Matrix Composites, Sponsored by: ASTM D30, March 22-24, 1994, Hilton Head Island, South Carolina.
- 23. "Damage Tolerance Based Life Prediction Methodology in Titanium Matrix Composites", L.J. Ghosn, J. Telesman, and P. Kantzos, 7th Annual HITEMP Review, vol. II: Compressor/Turbine Materials, NASA CP 10146, Oct. 24-26 1994, pp. 39-1, 39-10.
- 24. "Fatigue Crack Growth and Fiber Bridging in a ["30]2s SCS-6/Ti-15-3 Composite", P. Kantzos, R. Klaassen, L.J. Ghosn, and J. Telesman, 7th Annual HITEMP Review, vol. II: Compressor/Turbine Materials, NASA CP 10146, Oct. 24-26 1994, pp. 38-1, 38-11.
- 25. "The Effect of Fiber/Matrix Thermal Expansion Mismatch on Fiber Debond Initiation During Fiber Push-Out", J.I. Eldridge, P.B. Abel, and L.J. Ghosn, 7th Annual HITEMP Review, vol. III: Turbine Materials-CMC's, Fibers/Interfaces, NASA CP 10146, Oct. 24-26 1994, pp. 82-1, 82-11.
- 26. "Influence of the Failure Mode on Fatigue Crack Growth Behavior in Single Crystal Superalloys", J. Telesman, L.J. Ghosn, and D.P. DeLuca, Proceedings of the TMS fifth International Conference on the Effect of Hydrogen on the Behavior of Materials, Thompson, A.W abd Moody, N.R., Eds., Jackson Lake Lodge, Moran, Wyoming, September 11-14, 1994, pp. 943-952.
- 27. "Fatigue Crack Growth in Unidirectional Titanium Matrix Composites", L.J. Ghosn, J. Telesman, and P. Kantzos, Proceedings of the 1th International Conference on Composites Engineering, August 28-31, 1994, New-Orleans, pp. 161-162.

- 28. "Closure Pressure Distributions and Their Effect on the Crack Driving Force of Bridged Cracks", Presented at the 6th Annual HITEMP Review, Oct. 26 1993, Westlake, Ohio.
- 29. "Modelling of Crack Bridging in SCS-6/Ti-Based MMC's," Presented at the 8th Technical Conference of the American Society for Composites, October 20, 1993, Cleveland, Ohio.
- 30. "Effect of Crystal Orientation on the Fatigue Crack Growth Behavior of a Single Crystal Alloy," Presented at the Fatigue 93 Conference, May 3, 1993, Montreal, Canada.
- 31. "Modeling of Crack Bridging in SCS-6/Ti-Based Composites," Presented at the Mechanical Engineering Graduate Seminar, Worcester Polytechnic Institute, Feb. 26, 1993, Worcester, MA.
- 32. "In Situ Observations and Modeling of the Micro-Mechanics of Interfacial Failure in [90]8 SCS-6/Ti-15-3 MMC", J. Telesman, R.A. MacKay, and L.J. Ghosn, 6th Annual HITEMP Review, vol. II: Compressor/Turbine Materials, NASA CP 19117, Oct. 1993, pp. 43-1, 43-14.
- 33. "Closure Pressure Distributions and Their Effect on the Crack Driving Force of Bridged Cracks", L.J. Ghosn, J. Telesman, and P. Kantzos, 6th Annual HITEMP Review, vol. II: Compressor/Turbine Materials, NASA CP 19117, Oct. 1993, pp. 45-1, 45-12.
- 34. "Interface and Fiber Properties Under Various Fatigue Loading Conditions", P. Kantzos, P. Bartolotta, L.J. Ghosn, and R. Klaassen, 6th Annual HITEMP Review, vol. II: Compressor/Turbine Materials, NASA CP 19117, Oct. 1993, pp. 47-1, 47-12.
- 35. "The Effect of Fatigue Loading on the Interfacial Shear Properties of SCS-6/Ti-Based MMCs", P. Kantzos, P. Bartolotta, M.J. Verrilli, and L.J. Ghosn, Proceedings of the American Society for Composites, 8th Technical Conference, October 19-21,1993, Cleveland, Ohio, pp. 705-714.

- 36. "Modelling of Crack Bridging in SCS-6/Ti-Based MMC's", L.J. Ghosn, P. Kantzos, and J. Telesman, Proceedings of the American Society for Composites, 8th Technical Conference, October 19-21,1993, Cleveland, Ohio, pp. 705-714.
- 37. "Specimen Geometry Effects on Fiber Bridging in Composites", L.J. Ghosn, J. Telesman, and P. Kantzos, Fatigue 93, May 3-7, 1993, Montreal Canada, vol. II, pp. 1231-1238.
- 38. "Effect of Crystal Orientation on the Fatigue Crack Growth Behavior of a Single Crystal Alloy", J. Telesman, and L.J. Ghosn, Fatigue 93, May 3-7, 1993, Montreal Canada, vol. II, pp. 835-840.

# 1992

- 39. "Analysis of Interfacial Failure in SCS-6/Ti-Based Composites During Fiber Pushout Testing", Presented at the 5th Annual HITEMP Review, Oct. 27 1992, Westlake, Ohio.
- 40. "Effect of Curvature on Crack Stress Field," Presented at the Workshop on Fracture Test Methods Size Requirements and Related Problems, Sponsored by ASTM Committee E24, May 5, 1992, Pittsburgh, Pennsylvania.
- 41. "Stochastic Modeling of Crack Initiation and Short-Crack Growth," Presented at the 1992 ASME Applied Mechanics, Materials and Aerospace Summer Meeting, April 28-May 1, 1992, Scottsdale, Arizona.
- 42. "Effect of Specimen Geometry on Fatigue Crack Growth and Crack Bridging in SCS-6/Ti-Based MMC's", J. Telesman, P. Kantzos, and L.J. Ghosn, 5th Annual HITEMP Review, vol. II: Compressor/Turbine Materials, NASA CP 10104, Oct. 1992, pp. 50-1, 50-12.
- 43. "The effect of Degradation of the Interface and Fiber Properties on Crack Bridging", P. Kantzos, L. Ghosn, and J. Telesman, 5th Annual HITEMP Review, vol. II: Compressor/Turbine Materials, NASA CP 10104, Oct. 1992, pp. 32-1, 32-14.
- 44. "Analysis of Interfacial Failure in SCS-6/Ti-Based Composites During Fiber Pushout Testing", L.J. Ghosn, P. Kantzos, J. Eldridge, and R. Wilson, 5th Annual HITEMP Review, vol. II: Compressor/Turbine Materials, NASA CP 10104, Oct. 1992, pp. 27-1, 27-12.
- 45. "Influence of Hydrogen on Fatigue Crack Growth of a single Crystal Alloy", J. Telesman and L. J. Ghosn, Proceedings of the Second Workshop on Hydrogen Effects on Materials in Propulsion Systems, May 20-21, 1992, NASA Marshall Space Flight Center, Alabama, Bhat, B.N., Dreshfield, R.L., and Vesely, E.J., eds., NASA CP3182, 1992, pp.121-130.
- 46. "The Effect of Fatigue Loading on the Interfacial Shear Properties of SCS-6/Ti-Based MMCs", P. Kantzos, J. Eldridge, D.A. Koss, and L.J. Ghosn, Proceedings of MRS Spring meeting, San Francisco, California, April 26-May 1, 1992.

# 1991

- 47. "The role of the interface in fatigue crack growth," Presented at Composite interface Issues, a NASA Lewis Workshop, October 2, 1991, Cleveland, Ohio.
- 48. "The effect of the residual stresses on the fatigue properties of MMC's," Invited speaker at the Department of Metal Science and Engineering Penn State University, July 2, 1991, State College, Pennsylvania.
- 49. "The effect of Fatigue on the interfacial friction properties of Ti-15-3/SCS-6 Composites", P. Kantzos, J.I. Eldridge, D. Koss and L.J. Ghosn, in Proceeding of the 4th HITEMP Review held 29-30 October, 1991, in Westlake Ohio, pp.36-1, 36-15.

- 50. "Modeling of crack bridging in SCS-6/Ti-15-3 composite," Presented at the 3rd annual HITEMP Review, October 31, 1990, Westlake, Ohio.
- 51. "Fatigue crack growth in unidirectional metal matrix composites," Presented at the Fourth International Conference on Fatigue and Fatigue Thresholds, July 18, 1990, Honolulu Hawaii.
- 52. "Fatigue crack growth in Composites," Presented at the Department of Civil Engineering Fall 1990 Seminar Series, Case Western Reserve University, September 28, 1990, Cleveland, Ohio.
- 53. "Modeling of Crack Bridging in SCS-6/Ti-15-3 Composite", L. J. Ghosn, J. Telesman and P. Kantzos, in Proceeding of the 3rd HITEMP Review held 30-31 October, 1990, in Westlake Ohio, pp.36-1, 36-10.

54. "Fatigue Crack Growth in Unidirectional Metal Matrix Composite", L.J. Ghosn, J. Telesman and P. Kantzos, in Proceedings of the Fourth International Conference on Fatigue and Fatigue Thresholds held 15-20 July, 1990, in Honolulu Hawaii, vol. II, pp. 893-898.

# 1989

55. "Fatigue Crack Growth Behavior of SCS-6/Ti-15-3 Composite As Observed Through An SEM loading Stage", P. Kantzos, J. Telesman, and L.J. Ghosn, 2nd HITEMP REVIEW 1989, NASA CP 10039, Oct. 1989, pp. 66-1, 66-10.

# 1988

- 56. "Fatigue crack growth in a single crystal supperalloy," Presented at ASTM sub-committee E9.01 on Fatigue Research, April 1988, Atlanta Georgia.
- 57. "Accelerated Fatigue Crack Growth Behavior of PWA 1480 Single Crystal Alloy and Its Dependence on the Deformation Mode", J. Telesman and L.J. Ghosn, Proceeding of the sixth international symposium on superalloys, Superalloys 1988, pp. 615-624, (also NASA TM 100943 June 1988).
- 58. "Reliability based analysis of contact problems", L.M. Powers, and L.J. Ghosn, in Probabilistic Methods in Civil Engineering, Proceeding of the 5th ASCE specialty conference, Virginia Polytechnic Institute and State University, Blacksburg Virginia, May 25-27, 1988, pp. 112-115.
- 59. "Mode II fracture mechanics" R.J. Buzzard, L.J. Ghosn, Lewis Structures Technology-1988, NASA CP 3003, vol. 3, 1988, pp. 149-159.

# 1986

60. "Analysis of mixed-mode crack propagation using the boundary integral method", A. Mendelson and L.J. Ghosn, in Computational Mechanics '86: Theory and Applications, Proceeding of the international conference on computational mechanics, May 25-29, Tokyo Japan, 1986, pp. V-219 V-225.